

Role, Trends, and Challenges of Occupational Health in China's Marine and Heavy Engineering Industry

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ABSTRACT

The past 30 years have witnessed dramatic social and economic shifts in China, a rapidly developing country. However, these shifts have resulted in an explosion of work-related illnesses. For instance, workers on ships face a wide range of potential dangers to their health. As a basic human right, a secure workplace is expected of all employees. However, despite the widespread adoption of basic safety precautions, poor working conditions persist, especially in underdeveloped nations. Workers' health is largely determined by the level of occupational health and safety provided in each workplace. The rapid industrialization, technological innovation, and globalization over the past few years have created complex work environments that expose workers to classic and novel occupational hazards. For instance, manufacturing involves a broad spectrum of chemical, physical, and psychological risks. Problems with occupational health also affect people on all levels of society. The state, management, company, and worker each have duties to provide a safe workplace through medical, engineering, and legislative measures. In China, the general condition of occupational health remains critical. This paper will further discuss the role, trends and challenges within China's marine and heavy engineering industry. In the future, the technology-dominated strategies to occupational safety in China should start involving people at the company and administrative levels in occupational health planning and in promoting occupational health education and awareness.

Keywords: heavy engineering industry; occupational health challenges; marine; China

INTRODUCTION

This rapid proliferation of new sectors and their associated risks is a direct result of China's rapid economic and social transformation over the past three decades. In this "global factory," issues related to worker health and safety persist. Occupational diseases not only negatively impact workers' health by increasing their overall disease burden but can also reduce business profitability and societal peace and stability (Ding et al., 2013). Over 500 researchers and practitioners in occupational health from China, the US, and other countries met at the Beijing International Center in Beijing, China on August 2017 where they all reached the same conclusion: occupational diseases are a major barrier to the long-term growth of the social economy. As a result, the prevention and control of occupational sickness have emerged as pressing public health and social concerns for nations all over the globe (Rushton, 2017). In China, occupational health is a fundamental policy. The need for effective solutions to promote occupational health is critical and pressing in light of the fact that many nations are confronting major problems and challenges in occupational illness prevention and treatment and that the needs of employees in this area are constantly growing. Various strategies and policies are currently being implemented by countries worldwide in an effort to gradually decrease the prevalence of occupational sickness. The goal of entrepreneurship education is to develop company's future owners among today's generation. Entrepreneurship education can instruct, or at the absolute least, guide people in beginning their own organizations (JING, 2022).

Work-related illnesses pose a global issue, including in China (Ding et al., 2013). More than 80 million cases of occupational sickness have been reported in China since its reform and

opening-up in 1978 according to data from the National Health and Family Planning Commission (NHFPC). Still a developing nation, China already ranks high on the global stage as the most populated state and second largest economy (Rowley, 2012). Furthermore, over the last several decades, China has witnessed significant industrialization, urbanization, and economic growth, which have altered its industrial structure and increased the size of its labor force.

Spending on healthcare has been on the rise in China. According to the Chinese National Bureau of Statistics, in 2016, healthcare costs amounted to \$700 billion or 6.2% of the country's GDP. Industrial pneumoconiosis, occupational toxicosis, and occupational dermatoses have all been successfully treated using a variety of strategies and procedures for occupational disease prevention and treatment (State Administration of Work Safety, 2017). The health of workers, the success of businesses, the growth of the economy, and the stability of society are all threatened by occupational sickness in China (Zhong et al., 2015). China still sees tens of thousands of new cases of occupational disease every year despite showing considerable improvements in its occupational health in recent years (State Administration of Work Safety, 2017).

Foxconn Shenzhen, as the largest contract electronics manufacturer in the world, has been under severe scrutiny recently due to a slew of suspected suicides in its factory. Despite widespread claims in the media that working and living conditions at Foxconn are deplorable, I can attest that they are significantly better than those at the vast majority of other manufacturers. While the recent events surrounding Foxconn are tragic, millions of its workers also face dangers on their jobs daily. Wintek, another major electrical manufacturer, announced in May 2010 that 44 of its employees were poisoned by n-hexane, a well-known cleaning chemical typically employed in the textile industry. Although n-hexane has been linked to nervous system failure, many factories continue to utilize this chemical nevertheless.

China will undoubtedly draw from the new list of globally renowned occupational diseases issued by the International Labor Office in March this year as the country appears to revise its occupational disease prevention legislation this year. Implemented in 2002, this legislation mandates that employers should focus on providing occupational-health-related information and check and protect the health of their workers to aid in the treatment and verification of occupational hazards. While this list may serve as a starting point, China still has long way to go to actually see any progress in its struggle toward better conditions due to the ineffective safeguards issued by the government. For instance, a government report disclosed that in 2009, China reported a total of 128 new cases of occupational sickness, but only 20% of high-risk workplaces in the country implemented prevention strategies. The health and safety risks posed by these factors are still not being taken seriously by many manufacturing facilities.

The global mobility of people, capital, goods, and information is increasing as a result of rapid technological growth, considerable advances in transport and communication, and shifts in work organization patterns (Newhook et al., 2011). Researchers in occupational health and safety have paid a great deal of attention to these shifts, including the rising prevalence of a wide range of geographic mobilities related to employment. These studies have shown that these shifts can introduce new hazards, threats, and challenges to worker safety across a variety of domains, including regulation and prevention (Cresswell et al., 2016). Health issues, such as cardiovascular disease, commuting injuries, stress, fatigue, and depression, have also been linked to frequent relocation for work in various industries, including mining, engineering, trucking, and petroleum and gas (Newhook et al., 2011). Although the exorbitant and complex work-related mobilities within nautical vocations are well-recognized, the marine transport workers in China have received scant attention.

To date, being a mariner is among the most hazardous jobs in the world. The fatality rates at work in the shipping business are much higher than those in the broader labor force.

According to a study conducted in Great Britain, people engaged in maritime work have a 21-fold higher risk of unintentional deaths on their jobs than the industry average. Lippel and Walters (2019) argued that commuting, working, and living in different locations due to employment may have far-reaching consequences for the health and safety of workers. Jobs that need employees to travel from one location to another, such as those in the maritime industry, present unique regulatory issues (Lippel and Walters 2019). Some restrictions imposed on seafarers leaving the worksite (often even in ports), severe weather conditions, spending lengthy periods away from their home, and residing and working on a floating platform are some of the workplace health and safety challenges being faced by maritime workers that are already recognized in the literature. However, most of these studies have only considered exposure to risks in the workplace and not during the commute. Moreover, most of these studies have focused on the occupational health and safety of seafarers on international voyages as opposed to coastal or interior voyages. Maritime transport scholars have a propensity to overlook occupational health and safety concerns resulting from geographical mobility due to their preoccupation with human factors and risk.

LITERATURE REVIEW

One of the most dangerous jobs is working on the seas (Acejo et al., 2018). Numerous studies have demonstrated the complexity of the health and safety threats being faced by mariners. Lefkowitz (2013) reported 850 injuries per 100,000 seafarers worldwide occurring between 2008 and 2012. From 2003 to 2012, the fatal accident rate for British seafarers was 14.5 per 100,000 employees, which was 20 times higher than that for the entire British workforce and 4.7 times higher than that for construction workers (Roberts et al. 2014). Several occupational dangers contribute to the comparatively greater injury and mortality rates among marine workers.

The occupational dangers faced by maritime workers can be classified into on-duty accidents, such as fractures caused by severed mooring lines, and off-duty injuries, including damage inflicted by slips, trips, and drops when seafarers are off duty (Roberts et al., 2014). Major mental health issues are also prevalent in the maritime workforce. Iversen (2012) compiled 20 published research from 1960 to 2009 and found that suicides accounted for 3.1% to 18.0% of all deaths among maritime workers on average. The World Health Organization estimates that 1.4% of all deaths in 2015 were the result of suicide (World Health Organization, 2020a). The suicide rates among mariners are also more than twice the global norm. Meanwhile, Lefkowitz and Slade (2019) assessed seafarers and found that 20% of them had suicidal thoughts, 25% showed symptoms of depression, and 17% showed symptoms of anxiety (Lefkowitz & Slade, 2019). Anxiety is four times as common among mariners than among oil and gas employees. Injuries and illnesses are also more common among crew members who are struggling with mental health issues, such as depression, anxiety, and suicidal thoughts (Lefkowitz & Slade, 2019).

One of the most significant health and safety risks in the shipping business is worker weariness (Shan & Neis, 2020). In 2019, the International Maritime Organization reiterated that weariness is a major threat to maritime security, health, and environment (International Maritime Organization, 2019). Seafarers must use a shift system due to the round-the-clock nature of marine transportation. Recognized safety management techniques to reduce fatigue-related incidents include crewing ships with a sufficient number of people, organizing regular staffing changes, and providing opportunities for shore leave.

A wide range of factors also contribute to occupational risks in the maritime industry, including work demands, poor weather conditions, dangerous circumstances on board, psychological and social dangers, and difficulties in management. Prolonged isolation from the

family and a steady social environment, barriers to communication between multinational troops, workplace violence, and sleep and rest abnormalities owing to watch keeping are only some of the emotional challenges experienced by these workers. Blame culture, inefficient safety communication owing to employment insecurity, and abandonment abroad are all threats to an organization (Runefors, & Borell, 2014). Social difficulties, such as piracy, war and conflicts, bribery requests, and unfair treatment in port states, are very difficult to forecast.

According to Sampson and Ellis (2019), sailors are more likely to experience mental health problems due to certain factors, such as isolation, loneliness, lack of shore leave, and separation from family. Ship-specific variables that contribute to sailors' feeling "low" include not being able to take shore leaves, having much work to accomplish, and poor eating habits (Iversen, 2012). Overall, 52.1% of sailors reported feeling "down" when they were refused to take any shore vacation. Sampson and Ellis (2019) interviewed sailors to emphasize the value of shore leaves. During their shore vacation, these sailors may spend quality time with their loved ones back home by logging onto the web, and the simple act of exploring a new landmass is enough to put a smile on their faces.

RESULT

CHALLENGES TO CHINA'S OCCUPATIONAL HEALTH

China needs to overcome several obstacles to successfully prevent and control occupational diseases. The National Plan for Occupational Disease Prevention and Control and the 13th Five-Year Plan for Work-Related Health Hazard Prevention and Control are two of the most recent government interventions that promote occupational disease prevention and reduction in China (State Administration of Work Safety, 2017). Chinese workers carry a significant occupational illness burden due to their exposure to numerous industries' worth of health dangers. Many of these workers become sick from working, with 30,000 new cases (and rising) of occupational disorders being reported each year. Cases of occupational sickness can be found in more than 30 different sectors, with the mining of coal and other fossil fuels, production of chemicals, and building trade industries accounting for the vast majority of these cases.

The responsibility of employers in ensuring the health and safety of employees in the workplace is also unclear. The developments in improving working conditions, offering workers with personal safety equipment, and integrating occupational health evaluations to guarantee the occupational health of peasants and deployed workers are insufficient because organizational justice remains low among the major supervisors of some employers. Even if the law stipulates that employers should offer regular occupational health examinations, services, and training to workers exposed to dangerous situations, not all businesses comply with such rule. Neither the capacity nor the framework for monitoring occupational health are appropriate. First, a major gap can be observed between the lack of oversight and the numerous health risks in the workplace. Moreover, the expert teams in charge of overseeing workplace health and safety are also severely lacking in some regions. Second, China lacks occupational safety and health supervision departments, whereas the government and industry management departments are not fulfilling their responsibilities in monitoring and inspecting occupational health.

Traditional occupational health hazards exist side by side with the emergence of new ones. Not only have we not managed to eradicate long-standing issues such as occupational pneumoconiosis and poisoning, but new technologies, processes, equipment, materials, industries, environmental pollutants, and other factors are constantly developing as potential causes of occupational diseases. For instance, modern chemicals, such as quaternary

ammonium compounds, pose fresh threats to worker safety. In conclusion, preventing and controlling occupational diseases in China are exceptionally difficult due to the presence of both established and novel risks in the workplace.

Occupation-related disease prevention and control are already challenging without the added complexity posed by the spread of occupational health hazards. These hazards are on the rise from coal and non-ferrous metal mining to IT and biotech to medical, from the city to the suburbs to the country, and from the largest to smallest businesses. First, the rapid expansion of new industries has led to the emergence of new occupational diseases, such as carpal tunnel syndrome, cervical spondylosis, and lumbar vertebrae disease. Second, the challenges in uniformly applying occupational health standards are exacerbated by the fact that these diseases are spreading to rural and disadvantaged areas and small and medium-sized businesses.

Workers in the agricultural sector are at higher risk of encountering occupational health hazards than the general population. Peasant workers, as a socially disadvantaged class, are not likely to receive sufficient aid in their fight against occupational diseases. In response to the accelerating urbanization in China, an increasing number of rural Chinese are leaving their farms for metropolitan centers in search of work. By the end of 2016, peasant workers in China were estimated to have reached 280 million, representing a 4.5 million increase from the previous year (Xinhua News, 2017); over 50% of this population are working in industries with substantial occupational health hazards (Dingming et al. 2019). Nearly 80% of all occurrences of occupational sickness in recent years have also been reported among peasant laborers (Dingming et al., 2019).

China currently lacks solid groundwork for preventing and controlling health hazards in the workplace. The country also suffers from a huge shortage of occupational health professionals, insufficient ability to monitor work-related diseases and health hazards, lack of useful information on occupational health hazards, and an increasing demand to optimize the existing standards, regulatory requirements, academic research, and engineering services for occupational health. The Chinese public is also ill-informed about the importance of protecting their health on the job. Unfortunately, not all businesses and municipalities invest enough resources into occupational health because they do not recognize the critical nature of preventing and controlling occupational diseases. Unfortunately, many workers, especially peasants, are also unaware of the resources available to them for the prevention and control of occupational diseases. Currently, occupational health lacks funding for research and technical assistance. China has a serious need to increase the quantity and quality of its occupational health services, but the country's development and arrangement of health service institutions are unbalanced.

OBJECTIVES AND TASKS OF OCCUPATIONAL HEALTH IN CHINA

Keeping workers safe and healthy on the job is essential in building a peaceful, wealthy, and healthy society. In 2016, China issued the Plan for a Healthy China 2030 (Wang et al., 2020) with the goal of providing health services to all citizens by 2030. China's ultimate goal is to increase the life expectancy of its citizens up to that in high-income countries (i.e., 75 years). This strategy also outlines how China may actually prevent and control occupational diseases by bolstering industry self-regulation, improving occupational health monitoring, firmly establishing employers' obligations, and focusing on eliminating the cause of occupational dangers.

The aims of the National Plan for Occupational Disease Prevention and Control are to considerably enhance employers' abilities to prevent and control occupational health hazards and to offer occupational health monitoring. Establishing employer accountability for employee health in the workplace is a primary objective. In this plan, more than 85% of

businesses in primary industries are required to report their projects involving occupational health hazards. More than 70% of major industries also need to have occupational health inspectors and workers, and over 85% of workplace dangers are planned to be identified on a regular basis. Over 90% of workers who are at risk due to their jobs will receive an occupational health examination, and above 95% of business owners and upper-level managers will receive trainings in occupational health. In the near future, more than 90% of healthcare and medical facilities are required to monitor the personal radioactivity dosage of their employees who are working with radiation.

Constructing a reliable system for preventing and controlling occupational diseases is another objective. In China, at least one medical and health institution in a city with subordinate districts is engaged in the work of diagnosing occupational diseases, which is necessary for the establishment of a perfect joint conference system of occupational disease prevention and control at the provincial, city, and county levels. In each county, at least one hospital or clinic is dedicated to diagnosing and treating workers affected by occupational diseases to construct an ideal system for monitoring and providing services related to workers' health in the workplace. With the hope of enhancing occupational illness surveillance and to further develop the system for monitoring diseases in the workplace, China plans to monitor key occupational illnesses in at least 90% of all its counties and districts. That occupational disease reports be of higher quality.

China also needs to focus on controlling occupational diseases in their origins, that is, the workplace. Some effective measures include (1) investigating occupational health hazards at a national scale, which will yield foundational data on the types of businesses, geographic regions, economic sectors, and employee demographics that are most at risk; (2) putting in place management processes to phase out or severely restrict the use of hazardous, out-of-date technologies, methods, and materials in favor of modern and less dangerous alternatives; (3) coal mining, non-ferrous metal mining, metallurgy, building, and chemical production are all high-risk occupations that should take additional precautions to prevent occupational diseases, such occupational pneumoconiosis and poisoning; (4) strictly addressing the root causes of occupational health hazards and encouraging firms with significant dangers to modernize their technologies; (5) improving measures for preventing and controlling workplace health risks, with a particular focus on high-risk dust and toxic compounds; and (6) incentivizing proactive company action to improve worker health.

The following measures also need to be executed to improve the responsibility of employers' over the occupational health of their employees: (1) maintaining a system of responsibility for the prevention and management of occupational diseases by monitoring, inspecting, and pressuring companies with significant occupational health dangers to do so; (2) supporting the hiring of full- or part-time occupational health managers and professionals in private companies and making sure that they have access to the resources they need to comply with the new regulations; (3) sharing occupational health experiences, developing occupational health demonstration resources, or any other means can provide employers with some direction that would allow them to assume primary responsibility for occupational disease prevention and control and to meet their legal obligations in guaranteeing the health of their employees; (4) facilitating the implementation of focused occupational health trainings by employers and raising the level of occupational health literacy among managers and workers; (5) improving the pre-evaluation of occupational health hazards and evaluation of the effects of health hazard control through occupational health protection facilities; and (6) encouraging employers to implement a system of occupational health that mimics the "three simultaneousness" of construction projects.

China also needs to ramp up its regulatory oversight, administrative measures, and law enforcement to better protect workers' health on the job (Hughes & Ferrett, 2012). The

following methods are proposed to accomplish this objective: (1) improving the overall quality of occupational health supervision teams and strengthening the establishment of occupational health supervision and administration structures; (2) ramping up efforts to improve primary occupational health supervision especially in smaller administrative units, such as counties and municipalities; (3) taking up legal responsibilities in occupational health monitoring and encouraging business owners to better manage the occupational health of their workers engaged in high-risk work, such as agriculture and transportation; (4) widening the scope of health and safety checks in the workplace or expanding the access of employees to facilities that provide occupational health services, disease diagnosis, and examinations; (5) bolstering supervision and inspection of industries, companies, and building projects with major occupational health risks; and (6) stopping or closing down high-risk activities as required by law.

The following strategies are proposed to enhance occupational health services in the workplace: (1) define the distribution, scale, role, and number of occupational health service facilities and enhance the occupational health infrastructure in accordance with the concept of proper dispersion of occupational health services to establish a complete occupational health service network; (2) implement measures for cooperative participation in occupational health services by actively involving disease control and prevention agencies, workplace health research institutes, medical centers, and hospitals specializing in occupational illness prevention and control; (3) facilitate the gradual incorporation of all healthcare facilities into workplace health management and promotion; (4) simplify occupational disease diagnosis methods, optimize occupational health service flowcharts, and improve the quality of occupational health services to reduce the cases of occupational pneumoconiosis among farmworkers; and (5) improve the available emergency care for workers who are exposed to occupational poisons and nuclear radiation, which should be prioritized as the funding for occupational health continues to rise.

China also needs to take steps in the following areas to provide excellent occupational health aid and patient care: (1) encouraging businesses to define occupational health concerns, such as the available protections for their workers, their working environment, and the prevention and control of occupational health hazards, by formalizing employer management of labor and employees, developing labor contracts in accordance with the relevant laws, and exercising appropriate supervision; (2) empowering both employees and employers to take their occupational health obligations seriously, particularly in private firms, by instituting a system of equitable participation and collective contracts that are linked to safety and health on the job in critical industries and exercising adequate supervision; (3) monitoring and pressuring businesses to pay their required premiums on time and in full for occupational accident insurance and establishing and utilizing a system of variable industrial injury health insurance costs based on the extent of occupational health threats; (4) guaranteeing that patients with work-related diseases have timely treatment available through critical illness insurance and health care aid programs in order to lower their medical costs in compliance with the regulations; (5) and maintaining effective coordination among occupational accident insurance, basic healthcare coverage, critical illness insurance, medical support, social charitable organizations, and commercial insurance; and (6) promoting positive social engagement in occupational health services, expanding the provision of these services, and innovating the ways that organizations can meet the expectations of their workers and employers across all sectors.

CONCLUSION

The developed world is increasingly interested in emerging economies, such as China and India, due to the enormous untapped investment possibilities in these markets and the availability of a large pool of relatively inexpensive labor. Huge infrastructure projects are being launched in these emerging economies thanks to the influx of foreign direct investments. In addition, numerous multi-national corporations are establishing their manufacturing or service bases in these countries in an effort to reduce their reliance on domestic labor. Emerging economies must therefore prioritize occupational health to maintain economic growth given that the size and complexity of the workforce are necessary in fueling such growth. Accidents and marine disasters, piracy, inadequate treatment options for high shipboard stress, weariness and isolation, communicable diseases, and exposure to dangerous substances are just some of the hazards that seafarers face on their job. The life of a seafarer is nevertheless fraught with danger, both during work and play, despite the advances in occupational safety norms onboard. Direct and indirect prevention of work-related hazards coming from dangerous practices and harmful substances, psychological stress, and lifestyle risks are essential in reducing the occupational health risks in seafaring. Measures should also be taken to enhance the first-aid training of crews and to improve the quality of on-board medical services and sanitation.

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